THE COCOONING HABIT OF THE WASP, MONOBIA QUADRIDENS.

By Phil Rau, Kirkwood, Mo.

Monobia quadridens occupies the old tunnels in wood made by the giant carpenter-bee, *Xylocopa virginica.* The cells are separated by double mud partitions, and the aperture sealed with a mud plug.[1]

I have already stated that the larva of this wasp spins no cocoon. I have subsequently found that not only is this true, but that the larva hibernates, naked and uprotected save by the walls of wood, and transforms into a pupa in the early spring. In the region about St. Louis, some winters are more severe than others, and I am inclined to think that the mortality is greater among these hibernants during severe winters than in mild ones. The winter of 1929–30 was more severe than usual, the temperature going below zero several times, sometimes as low as minus 10 or 12 degrees.

During the winter the mortality of *Xylocopa virginica* (which hibernates as adults in the wood tunnels) was heavy.[2] *M. quadridens* occupying similar burrows, suffered an even greater degree of mortality than did *Xylocopa.* During the following spring, when I found that only one adult emerged from one lot of 20 such burrows plugged by *Monobia,* and in another location three adults emerged from a lot of 29 burrows, I chopped open the galleries to learn the reason. There I found many soft, dead, fully grown larvae, untouched by parasites or disease, that had died before they pupated. When one considers that each mud-plugged opening represented from two to four young, one gets a conception of the enormous mortality. Under such circumstances, one wonders if death would have been less prevalent if the organisms had had the added protection of a cocoon.

M. quadridens was not always cocoonless. At some time in the phylogeny of the species a cocoon was probably made, for even now in the cells one sees a vestige of this cocooning habit. Scattered about the walls of the burrows and on the mud partitions,

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[1] Wasp Studies Afield, pp. 346–354. 1918.
[2] Paper in course of publication.

one often finds a veneer of thin, paper-like material, which has evidently been made by the larva in an effort to hold fast to a long lost habit. This veneer varies in area, thickness and location. It is very similar to that which we find in certain Eumenid wasps which make no pupal covering. This habit of using this scanty material, insufficient as it is for a cocoon, is undoubtedly a vestige of a cocoon-making habit. Whether the larva is made more comfortable by having some of the walls of its cell thus painted can hardly be asserted, since the condition occurs in only a part of the cells, and even there only a portion of the wall is so covered. I believe rather that a more logical explanation of the phenomenon is that it is of physiological necessity to the organism to have the body cleared of this material before transforming. I go into detail here merely to impress the reader with the fact that no real cocoon is made, because this is of importance in relation to the details that are to follow.

In September, a nest of *Monobia* was cut open longitudinally. As soon as the live larvae were exposed to view, a piece of cotton was lightly plugged into each opening, and so one by one they were all covered; the board in which they nested was carried into laboratory. A month later, when an examination was made, all the larvae were found to be in good condition. In one cell, however, where the cotton had been pressed too close, it adhered to the wood firmly, and when it was pulled away by force, I found that attached to it was a cocoon. This of course was cherished for the parasite which I assumed would emerge therefrom. When in due time no parasite emerged, the cocoon was opened, and there was found a dead larva of *M. quadridens.* Closer investigation proved that the structure was not a complete cocoon, but a wall built by the larva against the cotton so as to form a perfect covering for the anterior half of the body. It was thus impossible to separate the cotton from this material, since the fibers were mixed with it. The material of this shell was of the same kind and color as that which is sometimes seen in small quantity as a veneer on the interior of the cells, only in this case the wall of it was much thicker and reminded one, by its tenacity, of the cocoons made by *Odynerus dorsalis. Eumenes fraterna* likewise lines the interior of the pots with a similar, papery substance. It is interesting to note the occurrence of this phenomenon in the representatives of three distinct genera of this family.

Since a *Monobia* cell is protected by walls of wood, a cocoon might seem superfluous, and the species has almost lost the habit of making one. However, it seems that in times of need, as in the instance cited above, the vestigial instinct of cocooning can display itself in the building of a heavy sheath. This sheath, as I have said, resembles to a very great extent the heavy cocoon material of an allied species, *Odynerus dorsalis,* which needs a heavy cocoon for protection in its underground abode. This, I think, is a very fortunate find in that it substantiates the statements of Wheeler,[3] quoting Schroeder, who has experimented with a leaf-roller caterpillar. " 'When the spinning glands are exhausted, or when there is no opportunity to construct the case in the typical manner, phylogenetically older instincts, which are still manifested by other species of the genus, are released.' " Again (p. 13), " 'It is evident that in all cases like those above cited, vestigial instincts become manifest through the incidence of unusual conditions.' "

M. quadridens always makes a double-walled partition between the cells, and a vestibule near the doorway. The purpose of this I do not know, but it does give each cell an insulated space. Possibly the construction of the double-walled partition counterbalanced in a way the loss of the cocoon-spinning, but if so it availed the species very little hereabouts during the hard winter of 1929–30. Neither did the double wall keep out parasites, for in one nest of three cells, all of the young were parasitized by cuckoo-bees, *Chrysis* sp.

Abstrulia tessellata Melsh.—This peculiarly marked beetle was once taken from tanglefoot on the trunk of a large white oak in Sherborn, Mass. A live specimen was taken by sifting near the pond in Framingham, Mass., on June 13, 1930. The above records show indications of its comparative rarity or peculiar habitat in this locality.—C. A. Frost, Framingham, Mass.

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[3] Am. Journ. Psychology 19: 9–10. 1908.